PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PU030259	**FOR FURTHER ACTION**	See Form PCT/IPEA/416

International application No. PCT/US2004/010789	International filing date *(day/month/year)* 07.04.2004	Priority date *(day/month/year)* 29.08.2003

International Patent Classification (IPC) or national classification and IPC
G06T5/10

Applicant
THOMSON LICENSING S.A.et al

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

    a. ☒ *sent to the applicant and to the International Bureau)* a total of 3 sheets, as follows:

        ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

        ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

    b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

    ☒ Box No. I   Basis of the opinion

    ☐ Box No. II   Priority

    ☐ Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

    ☐ Box No. IV   Lack of unity of invention

    ☒ Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

    ☐ Box No. VI   Certain documents cited

    ☐ Box No. VII   Certain defects in the international application

    ☐ Box No. VIII   Certain observations on the international application

Date of submission of the demand 04.03.2005	Date of completion of this report 12.09.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Eckert, L Telephone No. +49 89 2399-7631

BEST AVAILABLE COPY

Box No. I   Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:

       ☐ international search (under Rules 12.3 and 23.1(b))
       ☐ publication of the international application (under Rule 12.4)
       ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

   Description, Pages

   1-7   as originally filed

   Claims, Numbers

   1-12   received on 07.03.2005 with letter of 04.03.2005

   Drawings, Sheets

   1/2, 2/2   as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
       ☐ the description, pages
       ☐ the claims, Nos.
       ☐ the drawings, sheets/figs
       ☐ the sequence listing *(specify)*:
       ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
       ☐ the description, pages
       ☐ the claims, Nos.
       ☐ the drawings, sheets/figs
       ☐ the sequence listing *(specify)*:
       ☐ any table(s) related to sequence listing *(specify)*:

   * *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

---

1. Statement

Novelty (N)	Yes:	Claims	1-12
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-12
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations (Rule 70.7):

   see separate sheet

Re. item V:

1. Reference is made to the following document:
    D1: US-A-5 641 596 (COK DAVID R ET AL) 24 June 1997 (1997-06-24)

2. Since none of the documents cited in the International Search Report contains an indication to derive cut frequencies of 2D band-pass filters which approximate grain patterns when operated on random noise, the application seems to contain subject matter which is both novel and inventive and hence fulfills the requirements of Article 33 PCT. However, the objections listed below apply; for the assessment of novelty and inventive step, the unclear parts have been construed as stated in the following objections.

Clarity:

3. The application does not meet the requirements of Article 6 PCT, because claims 1, 6 - 8 and 10 - 12 are not clear.

3.1. Re. independent claims 1 and 12: It is not clear how film grain samples can be transformed, since these could also exist as chemical structures. According to the description, p. 1, I. 17 - 28, the claims should have been directed to a method for modeling film grain patterns *in a digital image*.

3.2. Re. dependent claims 6, 7, 10 and 11: It is obscure what the intersection point(s) should be, because it is unclear what exactly intersects the curves. The clear teaching of the description, p. 6, I. 26 - p. 7, I. 26, should have been incorporated into the claims.

3.3. Re. dependent claim 8: In lines 8 - 10 of claim 8, reference is made to "a curve" and "the curve", i.e. to a *single* curve. Since according to the description, p. 6, I. 26 - p. 7, I. 26, each of the horizontal and vertical mean vectors is represented as a curve and cut frequencies are established from said associated curves, claim 8 should have been formulated accordingly.

Further remarks:

4. Contrary to the provisions of R. 6.4(a) PCT and the Guidelines, 5.12 and 5.13, claims 1 and 12 are drafted as separate independent method claims. Since claim 12 furthermore contains all the features of independent claim 1, claim 12 should have been drafted as a claim dependent on claim 1, cf. R. 6.4(a) PCT and the Guidelines, 5.15.

5. Contrary to the provisions of Rule 6.2(b) PCT, the features of the claims are not provided with reference signs placed in parentheses.

6. The description, p. 7, l. 21f. states that like numerals were used in fig.s 1 and 2, but actually, both figures do not have any numerals in common. As a consequence, the reference to "steps 107 and 108" (cf. p. 7, l. 24) is incorrect.

7. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the documents **D1** is neither identified in the description, nor is the relevant background art disclosed therein briefly discussed.

- 8 -

CLAIMS

1   1.   A method for automatically modeling film grain patterns, comprising the steps of:

2   transforming a set of film grain samples, comprised of at least one group of neighboring

3   pixels that retains information about film grain shape and size, to the frequency domain;

4   storing each set of coefficients resulting from such transform, the coefficients forming a

5   pattern;

6   analyzing the pattern created by the transform coefficients; and

7   estimating the cut frequencies of a 2D band-pass filter that can simulate the pattern of

8   transform coefficients by filtering random noise in a frequency domain.

1   2.   The method according to claim 1 further comprising the step of transmitting at

2   least one cut frequency in a Supplemental Enhancement Information message.

1   3.   The method according to claim 1 wherein the film grain samples are processed in

2   blocks of N x N pixels.

1   4.   The method according to claim 3 wherein the step of analyzing the pattern created

2   by the transform coefficients further comprises the steps of:

3   computing a mean block of N x N transform coefficients by averaging the transform

4   coefficients from all the stored blocks following a transformation of each N x N pixel block;

5   defining horizontal and vertical mean vectors of N components each by averaging the

6   mean block of N x N coefficients along rows and columns, respectively;

7   representing the horizontal and vertical mean vectors as separate curves; and

8   establishing horizontal and vertical cut frequencies from the curves represented by the

9   horizontal and vertical mean vectors, respectively.

1   5.   The method according to claim 4 further comprising the step of low pass filtering

2   at least one mean vector.

1   6.   The method according to claim 4 wherein one of the horizontal and vertical cut

2   frequencies is established from an intersection point in the curve representing a corresponding

3   one of the mean horizontal and vertical vectors, respectively.

Substitute Sheet

AMENDED SHEET

07-03-2005,

1   7.   The method according to claim 4 wherein each of a low and a high horizontal and
2   vertical cut frequencies is established from a first and second intersection points in the curve
3   representing the mean horizontal and vertical vectors, respectively.

1   8.   The method according to claim 3 wherein the step of analyzing the pattern created
2   by the transform coefficients further comprises the steps of:
3   computing a mean block of N x N transform coefficients by averaging the transform
4   coefficients from all the stored blocks following a transformation of each pixel block;
5   defining horizontal and vertical mean vectors of N components each by averaging the
6   mean block of N x N transform coefficients along rows and columns, respectively;
7   averaging the horizontal and vertical mean vectors into a single mean vector;
8   representing the mean vectors as a curve; and
9   establishing horizontal and vertical cut frequencies from the curve represented by the
10   mean vector.

1   9.   The method according to claim 8 further comprising the step of low pass filtering
2   the mean vector.

1   10.   The method according to claim 8 wherein one of a horizontal and vertical cut
2   frequencies is established from an intersection point in the curve representing a corresponding
3   one of the mean horizontal and vertical vectors, respectively.

1   11.   The method according to claim 8 wherein each of a low and a high horizontal and
2   vertical cut frequencies is established from a first and second intersection points in the curve
3   representing the mean horizontal and vertical vectors, respectively.

1   12.   A method for automatically modeling film grain patterns, comprising the steps of:

2   receiving a set of film grain samples

3   performing a transform on the set of film grain samples, comprised of at least one group

4   of neighboring pixels that retains information about film grain shape and size, to the frequency

5   domain

6   storing each set of coefficients resulting from such transform, the coefficients forming a

7   pattern;

8   analyzing the pattern created by the transform coefficients; and

9   estimating the cut frequencies of a 2D band-pass filter that can simulate the pattern of

10   transform coefficients by filtering random noise in a frequency domain.